TITLE TRANSMITTER, TELEMETER 1004390	LOCKHEED LOCKHEED AIRCRAFT CORPORATION MISSILE SYSTEMS DIVISION	TEST PROCEDURE ACCEPTANCE 1041366
		SHEET 1 OF 13 SHEETS

OPERATIONS AND CALIBRATION

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DATE: JULY 18,1958

TEST GROUP RESPONSIBILITY R C DATE: JULY 18, 1958

TEST SECTION RESPONSIBILITY F W DATE JULY 18, 1958

DESIGN RESPONSIBILITY J H Harley DATE JULY 18, 1958

DRA. # 18279

REFERENCES:

ATS # 1009887
Transmitter Assembly, Telemeter - 1004390
Schematic Diagram - 1016747
WIRING Diagram - 1016748
Transmitter Test Record - Page 8

PURPOSE:

This ATP provides the normal information, instructions and technical details necessary to implement the successful processing of the 1004390 Telemeter Transmitter in a manner consistent with ATS 1009887.

SUGGESTED EQUIPMENT: TELEMETER DEPT. 54-21

1 each Filament Power Supply, Perkin 6-5VFM or Equivalent
1 each Plate Power Supply, Dressen-Barnes 3-150B or Equivalent
1 each Wattmeter, Bird Electronics 61 or Equivalent
1 each Distortion Analyser HP 330B or Equivalent
1 each VTVM Voltmeter, HP 400D or Equivalent
1 each Receiver, FM, Clarke Special Purpose or Equivalent
1 each Oscilloscope, Dumont 304-AR or Equivalent
1 each Oscillator, HP 200CD Wide Range or Equivalent
1 each Volt-Ohmmeter, Simpson 260 or Equivalent
1 each Attenuator, General Radio 874-GA
1 each MSD Test Panel
1 each Frequency Meter, Gertsch FM 3 or Equivalent
1 each MSD 13-184 Meter Box, TR 631
1 each Transmitter, Telemeter - 1004390

All cables and leads necessary for proper operation.
Allow all equipment a five (5) minute warm-up period.

Note 1:

Output Freq. MC	Crystal Freq. MC	Quadrupler Freq. MC	Multivibrator Freq. MC	1st Mixer Freq. MC	Max. Value of C1 & C2	Max. Value of R1 & R2
225.5	44.80	179.20	Approx. 1.500	46.3	12	25K, 1W, 1%
229.5	45.60	182.40	Approx. 1.500	47.1	12	25K, 1W, 1%
233.5	46.40	185.60	Approx. 1.500	47.9	12	25K, 1W, 1%

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SUGGESTED BLOCK DIAGRAM AND PICTORIAL LAYOUT

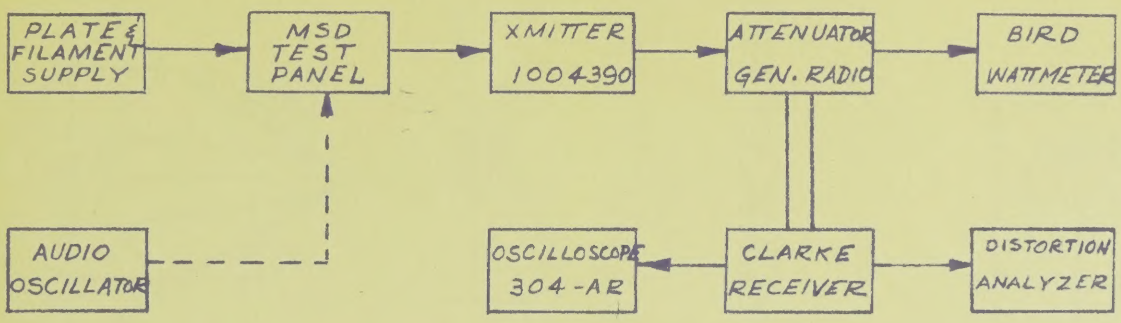
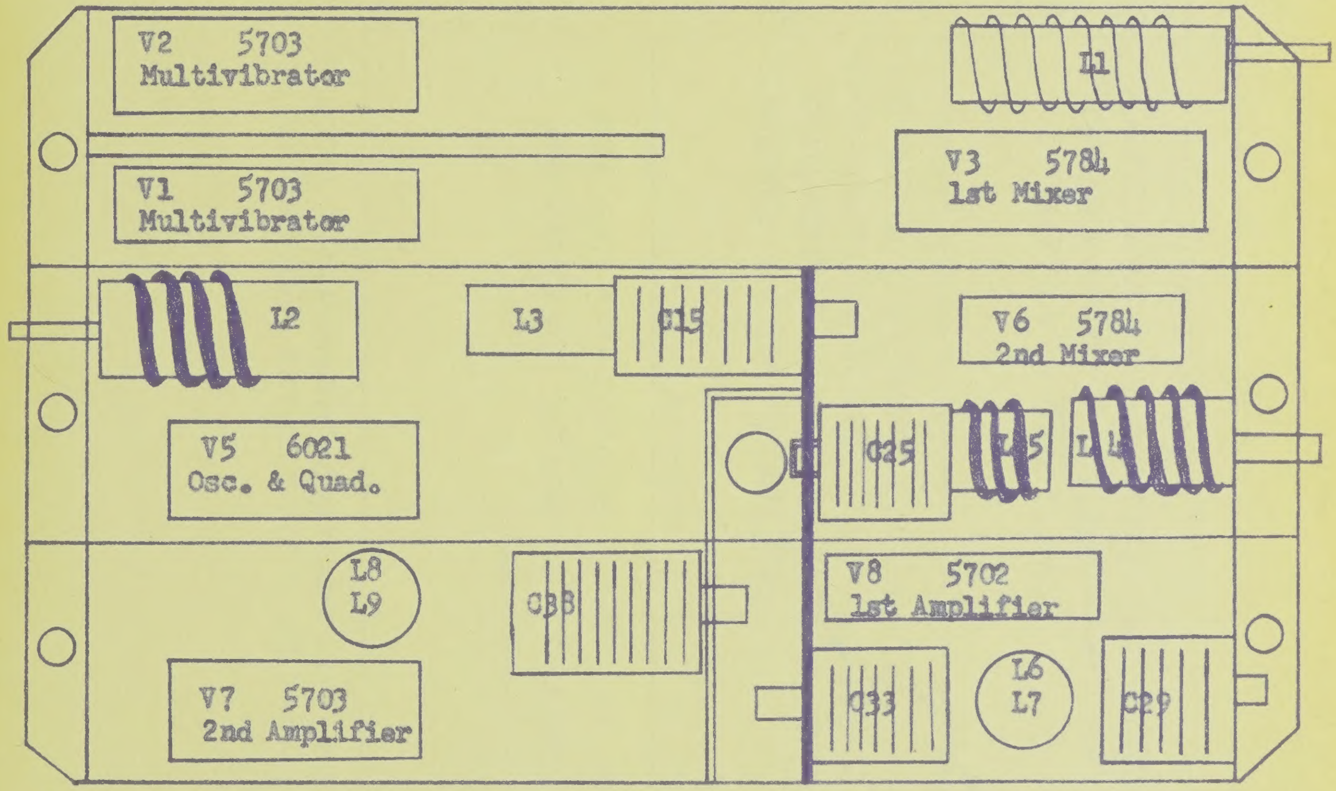


Figure 1



L1	1st Mixer Plate
L2	Crystal Oscillator Plate, Adjustable
L4	2nd Mixer Supressor Grid
L3	Quadrupler Plate
L5	2nd Mixer Plate
L6	1st Amplifier Plate, Fixed
L7	2nd Amplifier Cathode
L8	2nd Amplifier Plate
L9	Transmitter Output

C15	Quadrupler Plate
C25	2nd Mixer Plate
C29	1st Amplifier Plate, Adjustable
C33	2nd Amplifier Cathode
C38	2nd Amplifier Plate

Figure 2

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https://archive.org/details/lockheedtransmit00unse

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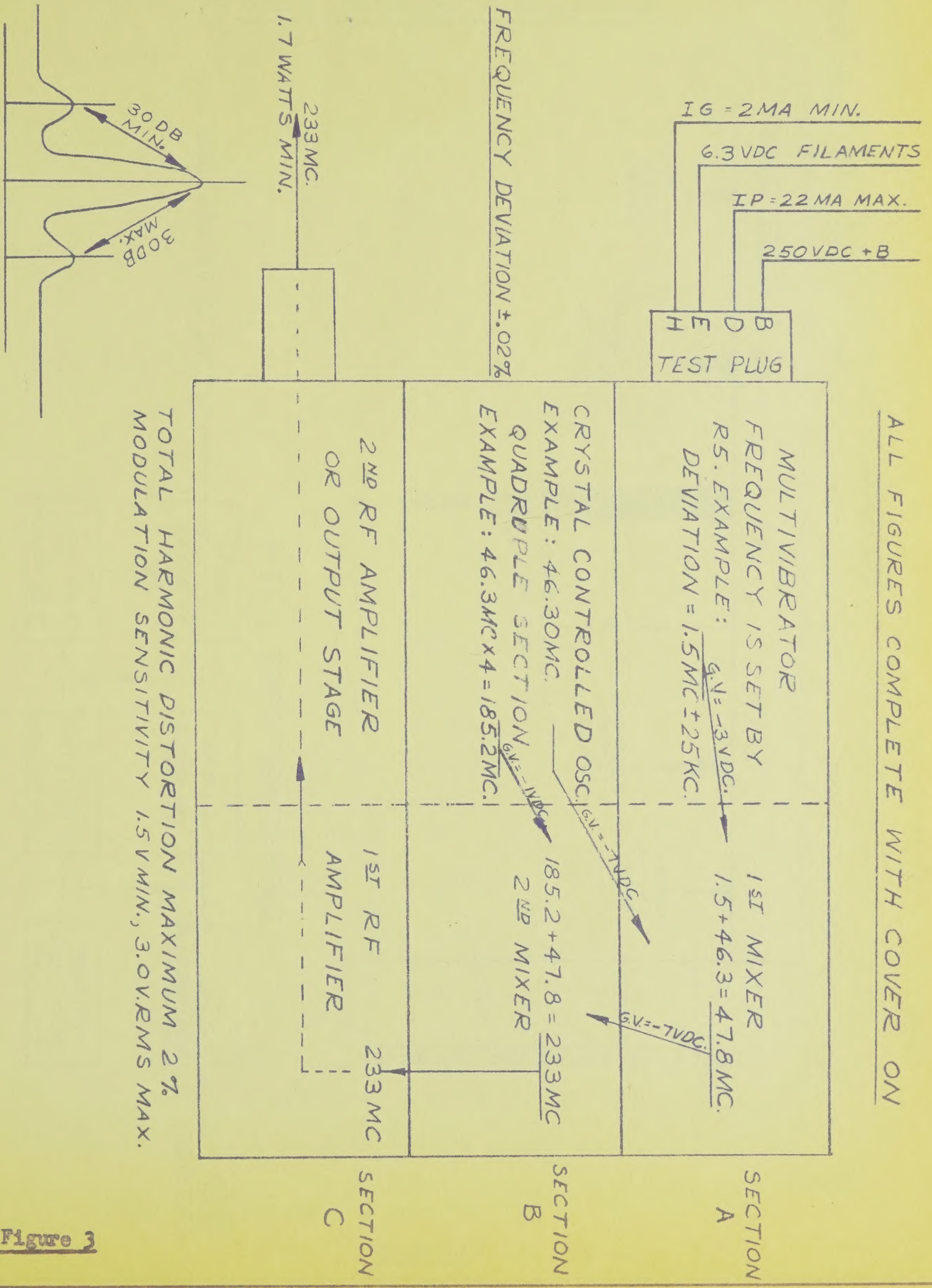
ALL FIGURES COMPLETE WITH COVER ON
IG = 2MA MIN.
6.3 VDC FILAMENTS
IP = 22 MA MAX.
250 VDC +B
H E D B
TEST PLUG
MULTIVIBRATOR FREQUENCY IS SET BY R5. EXAMPLE: DEVIATION = 1.5MC ± 25KC.
G.V. = -3 VDC.
1ST MIXER
1.5 + 46.3 = 47.8 MC.
G.V. = -7 VDC.
CRYSTAL CONTROLLED OSC. EXAMPLE: 46.30MC.
G.V. = -7 VDC.
QUADRUPLE SECTION EXAMPLE: 46.3MC x 4 = 185.2MC.
G.V. = -1 VDC
185.2 + 47.8 = 233 MC
2ND MIXER
FREQUENCY DEVIATION ± .02%
2ND RF AMPLIFIER OR OUTPUT STAGE
1ST RF AMPLIFIER
233 MC
233 MC.
1.7 WATTS MIN.
SECTION A
SECTION B
SECTION C
30 DB MIN.
30 DB MAX.
FC
F1
F2
TOTAL HARMONIC DISTORTION MAXIMUM 2%
MODULATION SENSITIVITY 1.5 V MIN., 3.0 V. RMS MAX.

Figure 3

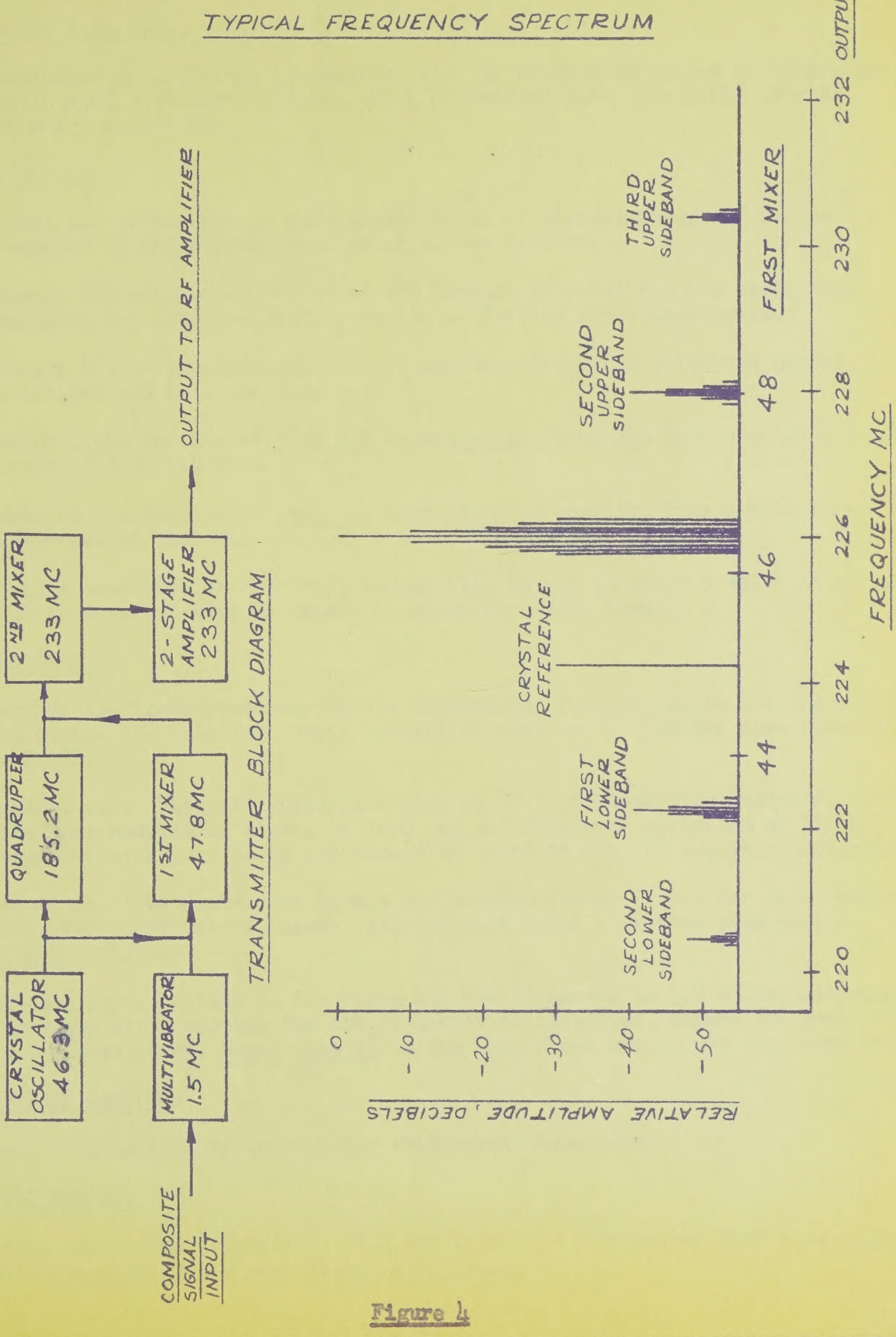
TYPICAL FREQUENCY SPECTRUM
OUTPUT
FIRST MIXER
THIRD UPPER SIDEBAND
SECOND UPPER SIDEBAND
CRYSTAL REFERENCE
FIRST LOWER SIDEBAND
SECOND LOWER SIDEBAND
232
230
228
226
224
222
220
48
46
44
FREQUENCY MC
0
-10
-20
-30
-40
-50
RELATIVE AMPLITUDE, DECIBELS
CRYSTAL OSCILLATOR 46.3 MC
QUADRUPLER 185.2 MC
2ND MIXER 233 MC
MULTIVIBRATOR 1.5 MC
1ST MIXER 47.8 MC
2-STAGE AMPLIFIER 233 MC
COMPOSITE SIGNAL INPUT
OUTPUT TO RF AMPLIFIER
TRANSMITTER BLOCK DIAGRAM

Figure 4

1.16 Repeat Step 1.14.

1.17 Modulation sensitivity, as measured with an HP 400D RMS meter or equivalent, should read a minimum of 1.5v. and a maximum of 3.0v. for 125KC carrier frequency deviation.

2.0 REJECTION:

2.1 Adjust the attenuator to a reference level of approximately 100 mv. as indicated on the signal level meter of the Receiver.

2.2 Measure the attenuated output of the Carrier (crystal and its harmonics) frequency and note the reading on the calibrated attenuator scale.

2.3 Measure the attenuated second upper sideband (contains twice the normal deviation) and note the reading.

2.4 Subtract the reading of Item 2.2 from Item 2.1 reading. This should be a difference of 30db Minimum.

2.5 Subtract the reading of Item 2.3 from Item 2.1 reading. This should be a difference of 30db Minimum.

2.6 If less than 30db is obtained, adjust C15, L1 and L4 until a value of at least 30db is obtained with no apparent change in Output Power.

3.0 RESPONSE:

3.1 Varying the input frequency to the transmitter from 80 cps to 80K cps should not change the Receiver output voltage as read on a voltmeter more than 2db or 20.5%.

3.2 Measure total harmonic distortion with an HP 330B Distortion Analyzer. With a Sine wave modulating signal of 1000 cps and frequency deviation of ±125KC, Maximum distortion should not exceed 2% (less source and receiver distortion).

3.3 Assume receiver distortion equals the maximum vendor figure for each receiver make. For Clarke model assume .5%. Subtract total of source plus receiver from Item 3.1 figures.

3.4 Set the input voltage to 225 volts and the filaments to 5.8 volts, allowing approximately 3 minutes for the filaments to stabilize. Record the power output on the Data Sheet. Note: Item 15 on the Data Sheet should not drop more than 40%.

4.0 QUALITY CONTROL:

4.1 Take unit to quality control for Mechanical Inspection.

5.0 TEST RECORD:

5.1 After successful Inspection, fill out Telemeter Transmitter Test Record. Sheet 8. Give Transmitter and Data Sheets to Leadman.

1.0 PROCEDURE:

1.1 Remove cover and make complete visual inspection.

1.2 Make continuity check of connections to Power plug.

Pin		Circuit	Resistance to Ground
A	to	Ground	0 Ω
B	to	B+	Infinity
C	to	Filament	Apprximately .5 Ω
D	to	Input	Infinity

1.3 Install lab set resistor R5, (Approximately 34K). This may be a potentiometer with a value of 0-100K.

1.4 Connect unit as shown in Figure 1.

1.5 With zero modulation on the input of the Multivibrator and with the Filaments on, set B+ between 135 vdc and 140 vdc as indicated on the test panel.

1.6 Check the oscillator slug L2. This is done by observing the total "B+" current on a Milliammeter. Turn the plug clockwise until the total current makes a sharp increase. This stops the oscillator stage and the transmitter ceases to function.

1.7 Turn the oscillator slug counter-clockwise until the total "B+" current drops sharply.

1.8 Turn the oscillator slug from 3/4 to 1 full turn further counter-clockwise as a precaution against oscillator "drop out". The total plate current should be from 74 ma. to 90 ma. under normal conditions, but should not exceed 95 ma.

1.9 Apply a 1000 cycle audio signal to the input of the multivibrator with the HP 200CD wide range oscillator set at 2 vrms as shown in Figure 1.

1.10 With the Receiver Meter on Zero and the signal strength between 1K and 10K mv., set the receiver to the frequency of the Transmitter.

1.11 Measure the receiver output RMS volts to insure ±125KC deviation, as labeled for each receiver, when the modulation is applied to the Transmitter.

1.12 Tune the receiver to the first upper sideband by observing the waveform on the oscilloscope.

1.13 Adjust L1 and L4 (first and second mixers) for maximum signal level as read on the receiver signal level meter.

1.14 Adjust C15, C25, C29, C33 and C38 for maximum RF Power Output.

1.15 Connect frequency meter antenna in the vicinity of the output line of the Transmitter. The unmodulated output frequency should be within .01% of center frequency as per schedule at 250v. and 265v. B+. If the frequency is not as per schedule, vary R5 potentiometer until this frequency is reached.

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OPERATIONS AND CALIBRATION

Transmitter Type ____________
Serial Number ____________
Technician ____________
Engineer ____________

Date ____________
Frequency ____________
Vehicle Number ____________
RF Amplifier No. ____________

TELEMETER TRANSMITTER TEST RECORD

		TEST REQUIREMENTS		
		Minimum	Actual	Maximum
1.	Supply Voltage "B+"	250 v.		250 v.
2.	Total Current "B"	0		95 ma.
3.	Heater Voltage "A"	6.3 v.		6.3 v.
4.	2nd Amplifier Plate Current	0		20 ma.
5.	2nd Amplifier Grid Current	2 ma.		8 ma.
6.	Power Output	1.7 W		0
7.	Assigned Frequency	-0.01%		+0.01%
8.	Modulation Sensitivity at 125KC Deviation	1.5 vrms		3.0 vrms
9.	Total Harmonic Distortion at 125KC Deviation	0		2%
9a.	Total Harmonic Distortion at 100KC Deviation	0		1.7%
9b.	Total Harmonic Distortion at 50KC Deviation	0		1%
10.	Response at 125KC Deviation	-2 db		+2 db
11.	Rejection: Carrier	30 db		0
12.	Rejection: Second Upper	30 db		0
13.	Frequency at 265 volts B+	-0.01%		+0.01%
14.	2nd Amplifier Plate Current at 265V. B+	0		22 ma
15.	Power Output at 225V. B+ and 5.8V., Filament	60% of #6		0

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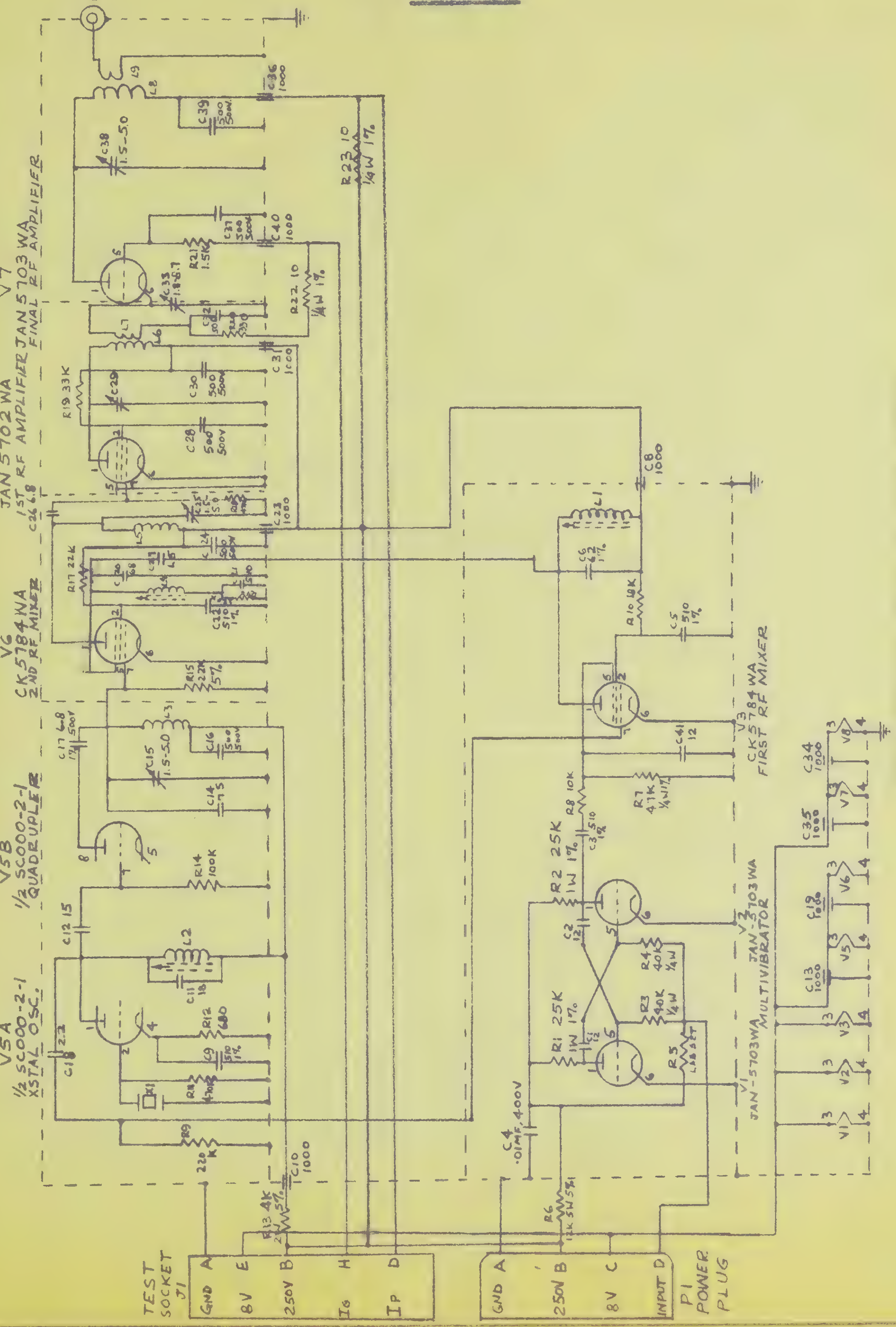
SCHEMATIC



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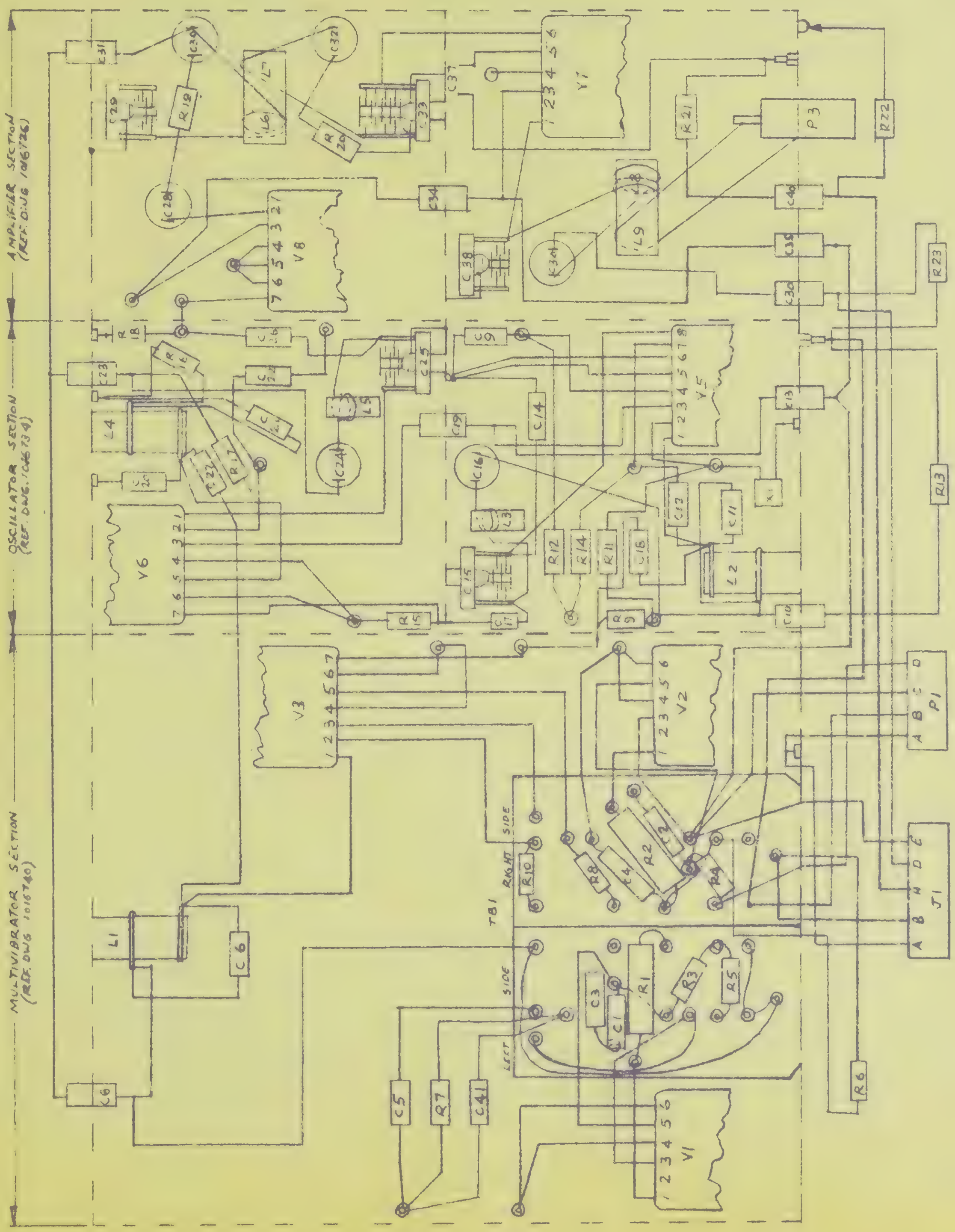
1016748

WIRING DIAGRAM



TITLE TRANSMITTER, TELEMETER 1004390	LOCKHEED LOCKHEED AIRCRAFT CORPORATION MISSILE SYSTEMS DIVISION	TEST PROCEDURE ACCEPTANCE 1041366 SHEET 11 OF 13 SHEETS

PARTS LIST

Component	Part #	Value	Mil Spec &/or Type and Co.	Nomenclature
R1	C-173B-25K-1%	25K, 1W Carbon, 1%	Mepco Inc. Morristown, N.J.	Resistor
R2	C-173B-25K-1%	25K, 1W Carbon, 1%	Mepco	Resistor
R3	C-170-40K-1%	40K, 1/4W Carbon, 1%	Mepco	Resistor
R4	C-170-40K-1%	40K, 1/4W Carbon, 1%	Mepco	Resistor
R5	C-170-1%	Varies from 33K to 68K, Carbon, 1/4W, 1%	Mepco	Resistor
R6	RSE5	12K WW, 5W, 5%	Dale Products Columbus, Nebr.	Resistor
R7	C-170-47K-1%	47K, 1/4W, 1%	Mepco	Resistor
R8	RC20GF103K	10K Carbon, 1/2W, 10%	Allen-Bradley Co. Milwaukee, Wisc.	Resistor
R9	RC20GF224K	220K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R10	RC20GF183K	18K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R11	RC20GF474K	470K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R12	RC20GF681K	680ohm Carbon " 10%	Allen-Bradley Co.	Resistor
R13	RSE2	4K, WW, 2W, 5%	Dalohm, Dale Prod.	Resistor
R14	RC20GF104K	100K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R15	RC20GF223K	22K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R16	RC20GF224K	220K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R17	RC20GF223K	22K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R18	RC20GF473K	47K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R19	RC20GF333K	33K Carbon, 1/2W, 10%	Allen-Bradley Co.	Resistor
R20	RC20GF331K	330 ohm Carb1/2W, 10%	Allen-Bradley Co.	Resistor
R21	RC20GF152K	1.5K Carbon 1/2W, 10%	Allen-Bradley Co.	Resistor
R22	HH10E10R00F	10 ohm WW, 1/4W, 1%	Hycor, Sylmar, Cal.	Resistor
R23	HH10E10R00F	10 ohm WW, 1/4W, 1%	Hycor, Sylmar, Cal.	Resistor
C1	CM15C120J	12uuf 300 VDC, 10%	El Menco Willimantic, Conn.	Capacitor
C2	CM15C120J	12uuf 300 VDC, 10%	El Menco	Capacitor
C3	CM15B511J	510uuf 300 VDC, 5%	El Menco	Capacitor
C4	96P10394S4	.01 uf, Vit.Q, 400V, 10%	Sprague Elec. Co. North Adams, Mass.	Capacitor
C5	CM15B511J	510uuf 300 VDC, 5%	El Menco	Capacitor
C6	CM15E620K	62uuf, 300 VDC, 5%	El Menco	Capacitor
C8	CF-700-3-102Z	1000uuf feed thru by-pass	Solar, Mfg. Co. Los Angeles, Cal.	Capacitor
C9	CM15B511J	510uuf 300 VDC, 5%	El Menco	Capacitor
C10	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C11	CM15B180K	18uuf 300 VDC, 10%	El Menco	Capacitor
C12	CM15B150K	15uuf 300 VDC, 10%	El Menco	Capacitor
C13	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C14	CM15B075K	7.5uuf 300 VDC, 10%	El Menco	Capacitor
C15	160-102	1.5-5.0uuf Trimmer	Johnson Co. Waseca, Minn.	Capacitor
C16	M-60	500uuf, 500W, 10%	Sangamo Elec. Co. Springfield, Ill.	Capacitor, Button
C17	Type 70	6.8uuf, 500 VDC, 1%	Vitramon, Inc. Bridgeport, Conn.	Capacitor Ceramic

PARTS LIST

Component	Part #	Value	Mil Spec &/or Type and Co.	Nomenclature
C18	TRCM15C2R2M	2.2uuf 300 VDC 10%	El Menco	Capacitor
C19	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C20	RCM15E680F	68uuf 300 VDC 5%	El Menco	Capacitor
C21	CM15B511J	510uuf 300 VDC 5%	El Menco	Capacitor
C22	CM15B511J	510uuf 300 VDC 5%	El Menco	Capacitor
C23	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C24	M-60	500uuf 500W 10%	Sangamo	Capacitor, Button
C25	160-102	1.5-5.0uuf Trimmer	E.F. Johnson Co.	Capacitor
C26	CRM15B068K	6.8uuf 300 VDC 10%	El Menco	Capacitor
C27	CRM15B015K	1.5uuf 300 VDC 10%	El Menco	Capacitor
C28	M-60	500uuf 500W 10%	Sangamo	Capacitor, Button
C29	160-102	1.5-5.0uuf Trimmer	Johnson	Capacitor
C30	M-60	500uuf 500W 10%	Sangamo	Capacitor, Button
C31	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C32	M-60	500uuf 500W 10%	Sangamo	Capacitor, Button
C33	160-104	1.8-8.7uuf Trimmer	Johnson	Capacitor
C34	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C35	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C36	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C37	M-60	500uuf 500W 10%	Sangamo	Capacitor, Button
C38	160-102	1.5-5.0uuf Trimmer	Johnson	Capacitor
C39	M-60	500uuf 500W 10%	Sangamo	Capacitor, Button
C40	CF-700-3-102Z	1000uuf feed thru	Solar	Capacitor
C41	CRM15B120K	12uuf 300 VDC 10%	El Menco	Capacitor
V1	5703 WA		Raytheon	Tube
V2	5703 WA		Raytheon	Tube
V3	5784 WA		Raytheon	Tube
V5	6021 WA		G. E.	Tube
V6	5784 WA		Raytheon	Tube
V7	5718 WA		Raytheon	Tube
V8	5702 WA		Raytheon	Tube
P1	M4P-		Winchester	Plug
P2	M5S		Winchester	Plug
P3	TR-493-19		I.P.C.	Connector
Y1	M-20, Varied Values	44.8 MC, 225.5 MC	Mc Coy	Crystal
		45.6 MC, 229.5 MC	Mc Coy	Crystal
		46.4 MC, 233.5 MC	Mc Coy	Crystal
L1	TR-662		MSD	Coil
L2	TR-662		MSD	Coil
L3	TR-662		MSD	Coil
L4	TR-662		MSD	Coil
L5	TR-662		MSD	Coil
L6	TR-662		MSD	Coil
L7	TR-662		MSD	Coil
L8	TR-662		MSD	Coil
L9	TR-662		MSD	Coil

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